ALUMINUM

Project Fact Sheet

Reducing Chloride Emissions from Aluminum Production

Benefits

- Potential to reduce energy needs industry-wide by 8.4 billion Btu/year by the year 2010
- Offers electric savings of up to 103.7 million Btu per unit/year; $55,000/year industry-wide
- Reduces chlorine fluxing usage from approximately 1.3 to 0.4 pounds/ton aluminum
- Reduces greenhouse gases by an estimated 17 tons per unit/year (one unit equals a single furnace load of 75,000 pounds of aluminum)
- Reduces industry-wide greenhouse gases by approximately 1377 tons/year by the year 2010
- Eliminates bag-house and wet scrubber technology for emission control
- Reduces maintenance costs

Applications

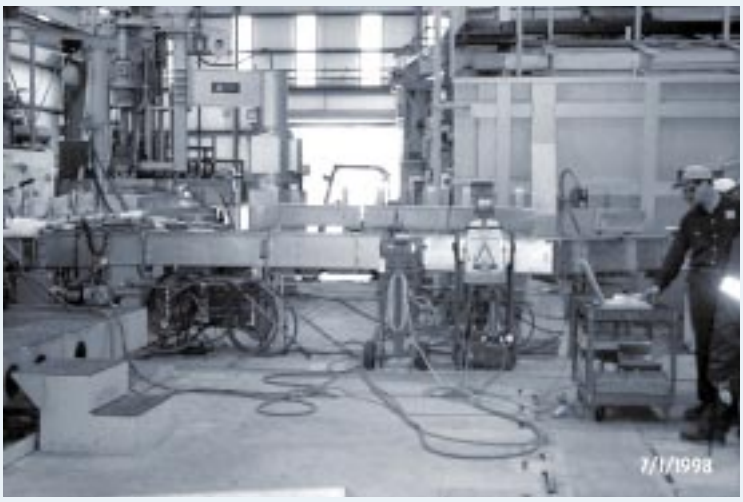
Though initially targeted to the primary aluminum industry, this new control technology is transferable to any molten aluminum application involving chlorine fluxing and consequent emissions.

New Method of Molten Aluminum Treatment Increases Energy Efficiency and Productivity While Reducing Waste and Raw Material Use

Reynolds Metals Company (RMC), with assistance from a NICE^3 grant, is developing for commercialization a closed-loop control process that greatly reduces chlorine emissions and increases plant efficiency while maintaining metal quality. The process still utilizes chlorine to remove impurities during aluminum processing, but is more effective than current methods. With the new technology, chlorine in the stack is monitored and input chlorine is adjusted continuously. This optimization of chlorine use results in substantially less waste because less chlorine has to be bought or produced by aluminum manufacturers.

This innovation is a significant improvement over conventional aluminum treatments, in which chlorine is injected in a more costly and wasteful manner. By the year 2010, the new technology has the potential to reduce the energy it takes to create chlorine by 8.4 billion Btu per year and to cut greenhouse gas emissions by 1377 tons per year.

Closed-Loop Control Process



The new "inline fluxing" system requires less chlorine, resulting in lower production costs and fewer harmful emissions released into the atmosphere.

Project Description

Goal: The project goal is to demonstrate closed-loop control of chlorine by installing a chlorine monitoring unit in the effluent stack at the new casting center at Reynolds Metals. An additional project goal is to establish interaction with the Aluminum Association to publicize and implement new technology at other domestic facilities.

Current processing used to remove impurities from aluminum requires a chlorine utilization of up to 1.5 pounds per 1000 pounds of aluminum. This processing does not include the ability to monitor waste chlorine in the furnace stack effluent. Conventional methods utilize pipes and wands to inject chlorine into molten aluminum. The new "inline" system developed by Reynolds Metals reduces the amount of chlorine required to about 0.4 pounds per ton. Efficiency is achieved by injecting fine bubbles of chlorine in both inline and batch applications in varying combinations. Reynolds will demonstrate this process coupled with new monitoring capability for chlorine in the stack effluent at its new casting center, using a 25,000 pound furnace (one-third the size of a typical processing furnace). Finer, longer-lasting chlorine bubbles are created with porous plugs installed in the bottom of the furnace. The system also includes an inline molten metal treatment system (HYCast) capable of producing extremely fine bubbles via a rotating impeller.

Reynolds Metals Company is demonstrating this new technology with assistance from the Virginia Department of Environmental Quality and the NICE^3 Program through the Department of Energy's Office of Industrial Technologies.

Progress and Milestones

- All equipment for the project is currently being acquired and constructed.
- Laboratory experiments are being conducted, involving stack monitoring, metal temperature, furnace bottom plugs, length of processing time, and inline treatment.
- A second series of tests is demonstrating the closed-loop component.
- Reports will be prepared regarding various tests conducted through the project.
- The project is being demonstrated at both the RMC Troutdale, Oregon and Massena, New York facilities.
- An analysis of the demonstrations will be made and followed by a final report.

Industry of the Future—Aluminum

Through OIT's Industries of the Future initiative, the Aluminum Association, Inc., on behalf of the aluminum industry, has partnered with the U.S. Department of Energy (DOE) to spur technological innovations that will reduce energy consumption, pollution, and production costs. In March 1996, the industry outlined its vision for maintaining and building its competitive position in the world market in the document, ***Aluminum Industry: Industry/Government Partnerships for the Future****.*

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NICE^3—National Industrial Competitiveness through Energy, Environment, Economics: An innovative, cost-sharing program to promote energy efficiency, clean production, and economic competitiveness in industry. This grant program provides funding to state and industry partners for the first commercial demonstration of energy efficient and clean production manufacturing and industrial technologies. Total project cost for a single award must be cost-shared at a minimum of 50% by a combination of state and industrial partner dollars. The DOE share for each award shall not exceed $500,000 to the industrial partner and up to $25,000 to the sponsoring state agency for a maximum of $525,000.

Project Partners

NICE^3 Program
U.S. Department of Energy
Washington, DC

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Richmond, VA

Virginia Department of
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